Wisconsin Weatherization

Replacement Gas Furnace Checklist

Customer: _____ Contractor: _____

Brand: _____ Model #: _____

Date Installed: _____ Serial #: _____

WisWAP BID: _____ **OR** WHEAP App#: _____

Check box, enter test results or requested number as item is inspected or completed. Indicate "N/A" if not applicable.

PMI = Per Manufacturer's Instructions. **Fuel Type:** ☐ **Natural Gas or** ☐ **Propane**

INSPECTION & ADJUSTMENTS

Documents:	☐ Photos documenting furnace conditions and manufacturer nameplate provided to Agency	
	☐ Installation information sticker (installer name, phone number, date)	
	☐ Warranty and manual in envelope attached to furnace	☐ Agency given copy of sizing calculation
	☐ Design temperature heat loss calculation: _____ BTU per hour	
Electrical:	☐ Service disconnect is present and operational	☐ Dedicated circuit and breaker properly rated
	☐ Set heat circuit and anticipator (thermostat) PMI	☐ Not applicable
Gas Piping:	☐ Sized for BTUs of all appliances ☐ No leaks	☐ Shut off present
	☐ Sediment trap present ☐ CSST bonded	
Air Filter:	☐ Filter opening covered/sealed ☐ Filter removes easily with no obstructions	
	Filter Size: _____ x _____	
General:	☐ Furnace elevated off basement floor. Note: If not in basement, can be on floor if approved PMI	
	☐ Combustion air and exhaust piping properly installed, terminated and supported	
	☐ Distribution plenums sealed and all major duct leaks properly sealed per specifications	
	☐ Condensate properly drained per local code and PMI	☐ Test holes sealed
	☐ Orphaned water heater has proper draft (see p. 2)	☐ Permit required

Installed and Measured BTUs of New Furnace:

BTUs (high input): _____ Measured Input (2 cu. ft. of gas): _____ Minutes: _____ Seconds: _____

BTUs (low input): _____ (if applicable) Measured Input (2 cu. ft. of gas): _____ Minutes: _____ Seconds: _____

Measured Gas Pressure in Inches of Water Column(IWC):

Input (High): _____ Input (Low) – if applicable: _____ Manifold (High): _____ Manifold (Low): _____

Enter test result. Indicate "N/A" if installation is a space heater.

PERFORMANCE TESTING

Steady State Efficiency Test

Adjust to Achieve Typical Ranges for Gas Burning Appliances (see page 2)

SSE %	O2%	CO PPM	Intake Air °F	Flue °F	PMI AFUE%

Temperature Rise

Supply °F	Return °F	(Supply – Return)	PMI Min	PMI Max

Distribution Static Pressure

☐ IWC or ☐ Pa

	Return	Supply	Total Pressure
High Input			
Low Input			

Variable Speed Furnaces	Heating CFM*	Fan Speed Setting
High Input		
Low Input (if applicable)		

*CFM Measurement Method: ☐ Plate Method ☐ Fan Tables ☐ Other: _____

I certify the visual inspection and performance tests were completed as indicated.

Installer Signature: _____

Printed Name: _____

Date: _____

I certify the heating system was installed to my satisfaction on the date indicated.

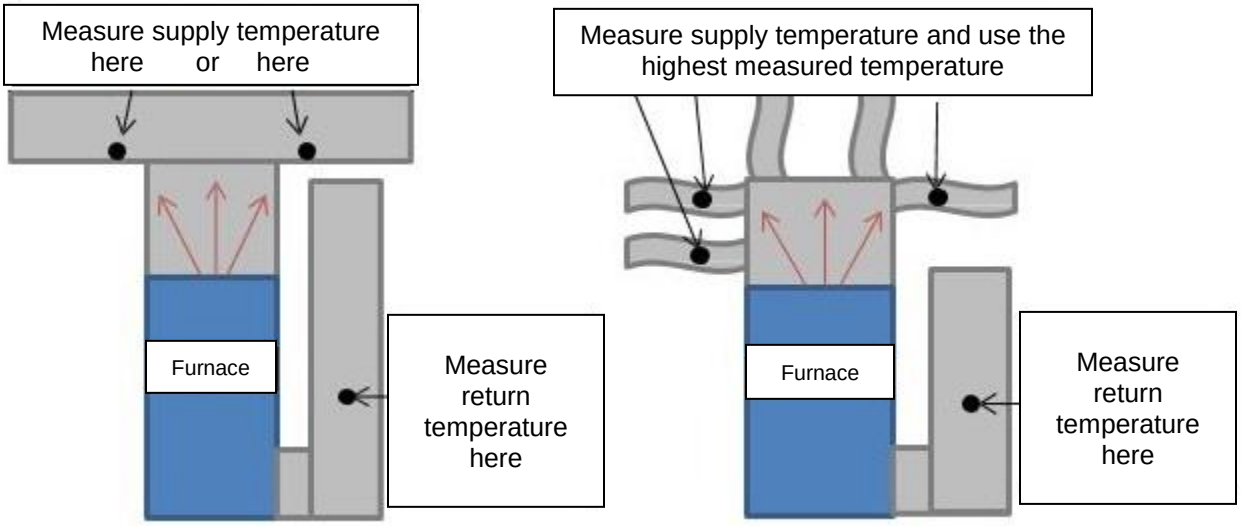
Customer Signature: _____

Printed Name: _____

Date: _____

Natural Gas and Propane Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide. Always follow manufacturer's instructions if they differ from listed typical specifications. Examples of temperature rise testing procedures below.



Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor			
°F	<10°	10°-90°	>90°
Pa.	-2.5	(°F Out / 40) - 2.75	-0.5
IWC.	-.010	(°F Out / 10,000) - 0.011	-.002

Typical Ranges for Gas Burning Appliances

Performance Indicator	SSE 80+	SSE 95+
Carbon monoxide (CO) ppm	≤ 100	≤ 100 or PMI
Stack temperature °F	325°- 450°	90°- 120°
Temperature Heat Rise °F	40° - 70°	45° - 70° or PMI
Oxygen (O_2) %	4 - 9%	4 - 9%
Natural gas pressure output at manifold - Inches of Water Column (IWC)	3.2 - 3.9 IWC	3.2 - 3.9 IWC
Propane pressure output at manifold (IWC)	10-11 IWC	10 – 11 IWC
Steady-state efficiency (SSE)	82 - 86%	95 - 97%
Supply temperature °F	120° - 140°	95° - 140°

Comments:

Wisconsin Weatherization

Replacement Oil Furnace Checklist

Customer: _____ Contractor: _____

Brand: _____ Model #: _____

Date Installed: _____ Serial #: _____

WisWAP BID: _____ **OR** WHEAP App#: _____

Check box, enter test results or requested number as item is inspected or completed. Indicate "N/A" if not applicable.
PMI = Per Manufacturer's Instructions.

INSPECTION & ADJUSTMENTS

Documents:	☐ Photos documenting furnace conditions and manufacturer nameplate provided to Agency	
	☐ Installation information sticker (installer name, phone number, date)	
	☐ Warranty and manual in envelope attached to furnace	☐ Agency given copy of sizing calculation
	☐ Design temperature heat loss calculation: _____ BTU per hour	
Electrical:	☐ Service disconnect is present and operational	☐ Dedicated circuit and breaker properly rated
	☐ Set heat circuit and anticipator (thermostat) PMI	☐ Not applicable
Fuel Supply:	☐ New fuel filter	☐ Tank and lines comply with NFPA 31
	☐ No leaks	☐ Purged fuel lines
Air Filter:	☐ Filter opening covered/sealed	☐ Filter removes easily with no obstructions
	Filter Size: _____ x _____	
General:	☐ Furnace elevated off basement floor	
	☐ Acceptable clearances of heating unit and vent connector to nearby combustibles per NFPA 31	
	☐ Distribution plenums sealed; all major duct leaks properly sealed per specifications	
	☐ Chimney inspected for compliance with NFPA 211	☐ Test holes sealed
	☐ Barometric damper control operates properly	☐ Permit required

Measured BTUs of New Furnace:

BTUs (input): _____ Nozzle GPH: _____ Nozzle Angle: _____ ° Nozzle Spray Type: _____

Note: The oil nozzle information is required to be posted on the furnace with the date of installation.

Measured Oil Pressure in Inches of Water Column(IWC):

PMI _____ PSI Measured _____ PSI

PERFORMANCE TESTING

Draft Measurements		
Flue Draft		Before barometric damper 10 – 15 Pa or 0.04-0.06 IWC or PMI
Overfire Draft		Must be a minimum of 5 Pa. or 0.02 IWC or PMI

Measured Smoke Number	
Smoke Spot Scale #:	

Steady State Efficiency Test

Adjust to Achieve Typical Ranges for Oil Burning Appliances (see page 2)

SSE %	O2%	CO PPM	Intake Air °F	Flue °F	PMI AFUE%

Distribution Static Pressure

☐ IWC ☐ Pa	Return	Supply	Total Pressure

Temperature Rise

Supply °F	Return °F	(Supply – Return)	PMI Min	PMI Max

Air Flow Rate Testing	Heating CFM*	Fan Speed Setting
High Input		

*CFM Measurement Method: ☐ Plate Method ☐ Fan Tables ☐ Other: _____

I certify the visual inspection and performance tests were completed as indicated.

Installer Signature: _____

Printed Name: _____

Date: _____

I certify the heating system was installed to my satisfaction on the date indicated.

Customer Signature: _____

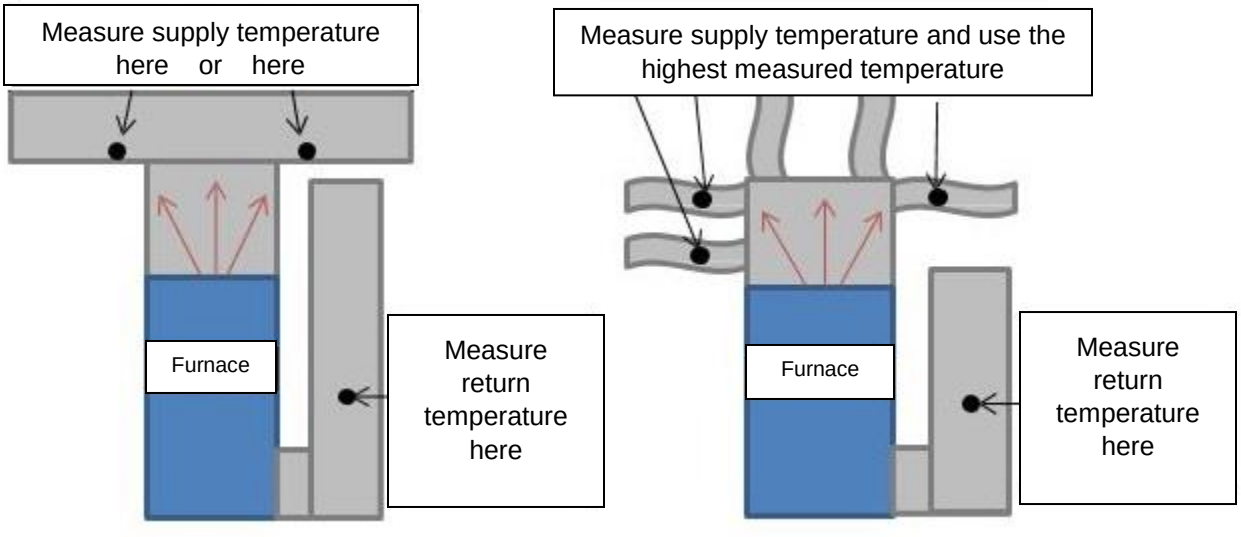
Printed Name: _____

Date: _____

Revised: June 2016

Fuel Oil Heating System Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide. Always follow manufacturer's instructions if they differ from listed typical specifications. Examples of temperature rise testing procedures below.



Typical Ranges for Oil Burning Appliances

Performance Indicator	Flame Retention
Carbon Monoxide (CO) ppm	≤ 100
Stack Temperature °F	300°- 450°
Oxygen (O_2) %	5 - 9%
Smoke Number (0-9)	< 1
Oil Pressure Pounds per Square Inch (psi)	100 – 150
Over-fire Draft (Inches of Water Column (IWC))	-0.02 IWC or -5 Pa
Flue Draft (IWC)	-0.04 to -0.01 IWC or -10 to -15 Pa
Steady-State Efficiency (SSE)	≥ 80%

Comments:

Wisconsin Weatherization

Replacement Boiler Checklist

Customer: _____ Contractor: _____

Brand: _____ Model #: _____

Date Installed: _____ Serial #: _____

WisWAP BID: _____ **OR** WHEAP App#: _____

Check box, enter test results or requested number as item is inspected or completed. Indicate "N/A" if not applicable.

PMI = Per Manufacturer's Instructions. **Fuel Type: ☐ Natural Gas ☐ Propane ☐ Oil**

INSPECTION & ADJUSTMENTS

Documents:
- ☐ Photos documenting furnace conditions and manufacturer nameplate provided to Agency.
- ☐ Installation information sticker (installer name, phone number, date)
- ☐ Warranty and manual in envelope attached to furnace ☐ Agency given copy of sizing calculation
- ☐ Design temperature heat loss calculation: _____ BTU per hour

Electrical:
- ☐ Service disconnect is present and operational ☐ Dedicated circuit and breaker properly rated
- ☐ Set heat anticipator (thermostat) PMI ☐ Not applicable

Gas Piping:
- ☐ Sized for BTUs of all appliances ☐ No leaks ☐ Shut off present
- ☐ Sediment trap present ☐ CSST bonded

Fuel Oil: ☐ New Fuel Filter ☐ No leaks ☐ Tank/Lines comply with NFPA 31 ☐ Purged Fuel Lines

General:
- ☐ Boiler elevated off basement floor. Note: If not in basement, can be on floor if approved PMI.
- ☐ Check clearances of heating unit and vent connector to nearby combustibles (Gas IFGC; Oil NFPA 31)
- ☐ Combustion air and exhaust piping properly installed, terminated and supported
- ☐ Installed Pressure Relief Valve PMI ☐ Test holes sealed
- ☐ Barometric controls operate properly PMI (if applicable) ☐ Permit Required
- ☐ Bled air from entire system ☐ Distribution Flushed
- ☐ Condensate properly drained per code and PMI Distribution pH: _____
- ☐ Orphaned water heater has proper draft (see p. 2) Hardness (grains/gallon): _____

Existing Load Terminals and Capacity:

Radiation Type: ☐ Fin Tube ☐ Radiator ☐ Baseboard ☐ Other: _____

Linear Feet: _____ (Fin Tube or Cast Iron Baseboard) Square Feet: _____ (Radiators)

Measured BTUs of New Boiler:

Design temperature: _____ °F Modulating Boiler Turndown Ratio (if applicable): _____ :

BTUs (input): _____ Measured Input (2 cu. ft. of gas): _____ Minutes: _____ Seconds: _____

Nozzle GPH: _____ Nozzle Angle: _____ ° Nozzle Spray Type: _____

Measured Gas Pressure in Inches of Water Column(IWC) or Oil PSI:

Input: _____ Manifold (High): _____ Manifold (Low): _____ Oil (PSI): _____

Installed Devices: Indicate what was installed. Steps must be taken to prevent condensation in non-condensing units.

☐ Air Excluding Device ☐ Mixing Valves ☐ Automatic Fill Valve ☐ Backflow Preventer ☐ Other: _____

☐ Wye Strainer ☐ Outdoor Sensor (install on North wall) ☐ Circulator Pump

HP	GPM	W
Size	Speed Setting	Watts

PERFORMANCE TESTING

Combustion and Draft Testing

Adjust to achieve typical ranges for applicable appliance (see page 2)

	☐ CO_2 ☐ O_2	CO PPM	Draft	Intake Air °F	Flue Temp °F	SSE %	AFUE %
High Input							
High Input PMI							
Low Input							
Low Input PMI							
Oil Boilers Only:		Overfire Draft:			Smoke Test #:		

Actual Boiler Setup	Warm Weather Shut Down		Design Temp
Outdoor Temp °F			
Boiler Supply °F			
Measured Temps °F	Supply	Return	Outdoor
Primary Loop (High Input)			

I certify the visual inspection and performance tests were completed as indicated.

I certify the heating system was installed to my satisfaction on the date indicated.

Installer Signature _____ Date _____ Customer Signature _____ Date _____

Replacement Boiler Specifications (Natural Gas, Propane (LP) and Fuel Oil)

Generally accepted ranges, excerpted from the Weatherization Field Guide. Always follow manufacturer's instructions if they differ from listed typical specifications. Examples of temperature rise testing procedures below.

Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor			
°F	<10°	10°-90°	>90°
Pa.	-2.5	(°F Out / 40) - 2.75	-0.5
IWC.	-.010	(°F Out / 10,000) - 0.011	-.002

Gas: Measure draft halfway between collar and chimney.

Typical Ranges for Gas Burning Appliances

Performance Indicator	SSE 80+	SSE 95+
Carbon monoxide (CO) ppm	≤ 100	≤ 100 or PMI
Stack temperature °F	325°- 450°	90°- 120°
Oxygen (O_2%)	4 - 9%	4 - 9%
Natural gas pressure output at manifold - Inches of Water Column (IWC)	3.2 - 3.9 IWC	3.2 - 3.9 IWC
Propane pressure output at manifold (IWC)	10 - 11 IWC	10 – 11 IWC
Steady-State Efficiency (SSE)	82 - 84%	95 - 97%
Supply temperature °F	120° - 140°	95° - 140°
Return Water Temperature-Non-condensing °F	> 120	N/A

Typical Ranges for Oil Burning Appliances

Performance Indicator	Flame Retention
Carbon Monoxide (CO) ppm	≤ 100
Stack Temperature °F	300°- 450°
Oxygen (O_2) %	5 - 9%
Smoke Number (0-9)	< 1
Oil Pressure Pounds per Square Inch (psi)	100 – 150
Over-fire Draft (Inches of Water Column (IWC))	-0.02 IWC or -5 Pa
Flue Draft (IWC)	-0.04 to -0.01 IWC or -10 to -15 Pa
Steady-State Efficiency (SSE)	≥ 80%
Return Water Temperature-Non-condensing °F	> 120

Oil: Measure draft between barometric damper and collar and at over fire.

Comments:

Heating System Repair or Clean and Tune Check List

Customer:_____ **Contractor:**_____

Telephone:_____ **Work Date(s):**_____

WHEAP/WX Agency:_____ **WisWap BID #:**_____

Fuel Type: ❑ Natural Gas ❑ LP/Propane ❑ Oil ❑ Other: _____ System Type: ❑ Forced Air ❑ Boiler ❑ Space Heater ❑ Other: ___

Input on label:_____ Output on label:_____ Measured Input (Clock meter):

Clean, inspect, test, and repair: Perform the following inspection procedures and maintenance practices on heating systems as necessary. The goal of these measures is to reduce carbon monoxide (CO), adjust fuel-air mixture, improve steady-state efficiency and verify the operation of safety controls. All holes that are drilled should be properly sealed after completion of testing.

All Systems

(✔ box, enter test results or requested number as item is inspected or completed. Indicate "N/A" if not applicable. Use comments box on P.2)

Emergency shut off	❑	Service disconnect is present and is operational
Electrical service.	❑	Inspect circuit. Rated for application. Note problems, make recommendations.
Fuel lines/storage tanks.	❑	No leaks present. Shut off present. Filter or sediment trap is present and clean.
Blower	❑	Clean.
Air Handler	❑	Clean.
Air Filter	❑	Clean or replace.
Heat exchanger	❑	Clean surface & inspect for leaks; inform customer & agency if exchanger is cracked.
Filter slot/filters	❑	Filter slot with cover is present. Replacement filters/ permanent filter present.
Thermostat	❑	Set heat anticipator to amperage measured in control circuit or PMI.

Oil Heating Unit

Oil filter	❑	Replace.
Nozzle	❑	Replace. Nozzle GPH_____ Nozzle Angle_____^{o} Spray Type_____
Electrodes	❑	Adjust gap and position in burner tube PMI.
Transformer	❑	Clean contacts. Measure voltage; replace if voltage is not within PMI.
Burner assembly and burner tube assembly	❑	Clean. Inspect for over burning. Replace flame retention head if damaged.
Combustion chamber	❑	Clean. If necessary, repair combustion chamber or replace.
CAD/Stack Control Cell	❑	Test. Verify that the burner shut off, PMI, when the cad cell is blocked from flame.
Flame Ignition	❑	Test. Ignition must be instantaneous; Pre-purge type unit, blower on prior to ignition.
Barometric Damper	❑	Plumb, level, swings freely.
Flue draft (before barometric damper)	❑	Measure and adjust as needed. (10-15pa or 0.04-0.06 IWC or PMI).
Over fire draft	❑	Measure and adjust as needed (5 Pa. or 0.02 IWC or PMI).
High limit control	❑	Measure shut off temperature adjust or replace if >250F^{0} (furnace), 180 F^{0}(boiler).
Oil Pump Pressure	❑	Measure, adjust to PMI.

NG or LP Heating Unit

Burners	❑	Check for dust, debris, misalignment, flame impingement, and other flame-interference problems. Clean, vacuum, and adjust as needed.
Burner/Manifold	❑	No soot, melted wire insulation, & rust in the burner & manifold area outside of firebox.
Pilot (if equipped)	❑	Burning, good ignition, check safety control for gas valve shut-off when pilot is out.
Gas Pressure (IWC)	❑	Input:_____ Manifold: _____

Test Results

Steady State Efficiency Test

Adjust to achieve combustion standards (Table 3-2 or 3-3).

SSE	O_2%	CO ppm	Smoke #	Flue F^{o}

Distribution Static Pressure

Measured in supply plenum and blower cabinet

Return Pressure	Supply Pressure	Air Flow Rate	Total Pressure	

Temperature Rise

PMI. If no instructions see specifications.

Supply °F	Return °F	Total Rise (Supply-Return)	PMI Range Min	PMI Range Max

I certify that the visual inspection, repair, maintenance, and the performance tests were completed as indicated.

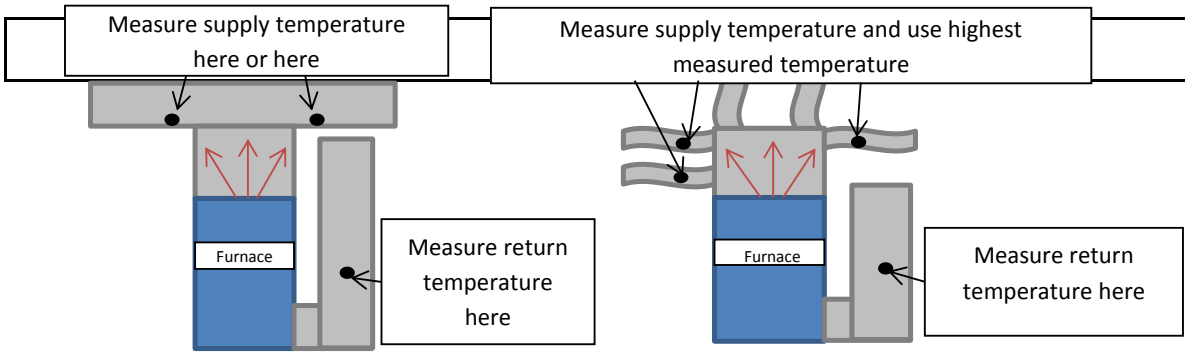
I certify that the heating system repair or maintenance work performed was to my satisfaction on the date indicated.

Installer's Signature _____ Date _____

Customer's Signature _____ Date _____

Natural Gas, LP & Fuel Oil Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.
Note: Always follow manufacturer's instructions, if they differ from listed specifications.
Examples of temperature rise testing procedures below



Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor Temperature			
°F	<10°	10°-90°	>90°
Pa.	-2.5	(°F_Out / 40) - 2.75	-0.5
IWC.	-.010	(°F_Out / 10,000) - 0.011	-.002

Table 3.2: Typical Ranges for Gas Burning Appliances		
Performance Indicator	**SSE 80+**	**SSE 90+**
Carbon monoxide (CO) ppm	≤ 100	≤ 100
Stack temperature °F	325°- 450°	90°- 120°
Temperature Heat Rise °F	40° - 70°	30° - 70°
Oxygen (O_2) %	4 - 9%	4 - 9%
Natural gas pressure output at manifold - Inches of Water Column (IWC)	3.2 - 3.9	3.2 - 3.9
Propane pressure output at manifold (IWC)	10 - 11	10 - 11
Steady state efficiency (SSE)	82 - 86%	92 - 97%
Supply temperature (°F)	120° - 140°	95° - 140°

Table 3.5: Typical Ranges for Oil Burning Appliances	
Performance Indicator	**Flame Retention**
Carbon monoxide (CO) ppm	≤ 100
Stack temperature °F	300°- 450°
Oxygen (O_2) %	5 - 9%
Smoke number (0-9)	< 1
Oil pressure pounds per square inch (psi)	100 - 150
Over-fire draft	-.02 IWC or -5 Pa
Flue draft	-.04 to -.01 IWC or -10 to -15 Pa
Steady state efficiency (SSE)	≥ 80%

Comments: